Cargill Salt

Watkins Glen Plant
518 East 4th Street
Watkins Glen, NY 14891

January 6, 2014

Nicole Foley Kraft, Chief
Ground Water Compliance Section
US Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10007-1866
Attn: Frank Brock

Ref: UIC Permit NYU105431

Dear Ms. Foley and Frank Brock:

Enclosed are the Mechanical Integrity Test results for Cargill, Watkins Glen, NY, class III salt solution mining wells, Wells 19, 20, 21 and 22. These wells were tested in September and October using the water-brine interface method. Test reports for all four wells are enclosed.

If you have any questions, please contact me at 607-535-6303 (Don_Chutas@cargill.com) or Mike Schumacher at 970-875-0124 (Mike_Schumacher@cargill.com).

Sincerely,

Don Chutas

Don Chutas
Plant Manager

enclosures

cc: M. Schumacher

Cargill

CARGILL INCORPORATED
WATER-BRINE INTERFACE
MECHANICAL INTEGRITY TEST REPORT

Address

Cargill, Inc.
Watkins Glen Plant
518 E. 4th Street
Watkins Glen , New York 14891
(607) 535-6300

General Information

UIC Permit	**NYU105431**
Field	**Watkins Glen**
Test well	**21**
Reference well	**24**
Other wells in gallery	**19,20,22,23**
Test well location	**Lat. 42°-23'-05", Long. 76°-51'-46"**
	Watkins Glen, New York
API No.	**31-097-21472**
Test Date	**02-Oct-13**
Test fluid	**Water**
Result	**PASSED TEST**

Test well data

Well no.	**21**		
Depth of surface casing	**948**	ft.	**Drilling record**
Depth to top of salt formation	**1758**	ft.	**12/92 Neutron log**
Depth to top of cavern	**1758**	ft.	**4/06 Gamma ray log**
Depth of production casing	**2195**	ft.	**11/03 Sonar Survey**
Depth of tubing (if present)	**none**	ft.	
Total depth	**2375**	ft.	**11/03 Sonar Survey**
Original total depth	**2675**	ft.	**Drilling record**
Outer diameter of production casing	**7**	in.	**Drilling record**
Outer diameter of tubing (if present)	**none**	in.	
Capacity of casing or annulus	**1.607**	gpf	
Volume of casing or annulus	**3527**	gals.	
Normal operating pressure	**240**	psig	
Mode of last 24 hours of operation	**Injection**		

All depths referenced to wellhead , elev. 447

Casing bent at 2052'

Reference well data

Well no.	**24**		
Depth of surface casing	**812**	ft.	**Drilling record**
Depth to top of salt formation	**1782**	ft.	**9/96 Gamma ray log**
Depth to top of cavern	**2503**	ft.	**9/98 Gamma ray log**
Depth of production casing	**2580**	ft.	**Drilling record**
Depth of tubing (if present)	**none**	ft.	
Total depth	**2580**	ft.	**6/97 Gamma ray log**
Original total depth	**2615**	ft.	**Drilling record**
Outer diameter of production casing	**7**	in.	**Drilling record**
Outer diameter of tubing (if present)	**none**	in.	
Capacity of casing or tubing	**1.6535**	gpf	
Volume of casing or tubing	**4266**	gals.	

All depths referenced to wellhead , elev. 445

Casing is perforated at 2550'

Target Depth for Interface

Normally 50 feet above the end of the casing or the cavern roof, whichever is shallower

Depth **1708** ft.

Instrumentation

Well	Test	Reference
Manufacturer	**Paroscientific**	**Paroscientific**
Model	**760-1K**	**760-1K**
Serial No.	**112335**	**115418**
Accuracy	**0.01%**	**0.01%**
Precision	**0.001 psi**	**0.001 psi**

Preparation

If the casing of the test well was most recently used for brine production, flush with water to remove any crystallized salt.

Date and time test well was flushed

Approximate volume in gallons

Shut-in period with water in casing

Comments

Second date and time well was flushed

Approximate volume in gallons

Shut-in period with water in casing

Comments **21 not flushed, last used for injection.**

The test well must be bled back to ensure that it is filled with a fluid of uniform density. Bleed back at least the volume of the casing or annulus.

Date test well was bled back **09/18/13**

Approximate volume in gallons **4,800**

Specific gravity of fluid **1.203**

Comments A slip blind was placed in the surface piping after the well was bled back to prevent leakage out of the wellhead.

The reference well must be bled back to ensure that it is filled with a fluid of uniform density. Bleed back at least the volume of the tubing or casing.

Date and time ref well was bled back **09/17/13**

Approximate volume in gallons **35,000** gals

Specific gravity of fluid **1.204**

Comments

Set Interface

Test fluid	**Water**
Specific gravity of test fluid	**1.000**
Specific gravity of brine	**1.203**

Calculate maximum permissible injection rate and target pressure differential.

Capacity of casing or annulus		Allowable velocity		Maximum inj. rate
1.607 gpf	x	20 fpm	=	**32** gpm

Target interface depth x gradient diff. = target pressure diff.

1708 ft. x (1.203 - 1.000) X 0.433 = 150.1 psi

Date	**09/30/13**				change
	Time	Test Well	Ref. Well	Diff.	in diff.
Pressures before injection	**13:00**	**58.511**	**49.579**	**8.932**	
Pressures during injection	**14:20**	**139.982**	**49.868**	**90.114**	**81.182**
Pressures during injection	**15:20**	**177.861**	**49.954**	**127.908**	**118.976**
Pressures after injection	**16:10**	**209.746**	**50.028**	**159.719**	**150.786**

All pressures measured in psia

Calculated final interface depth

150.786 psi / ((1.203 - 1.000) X 0.433) = 1715 ft.

Note : amount of injection fluid not measured

Temperature Stabilization Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start Stabilization	**09/30**	**16:10**	**209.746**	**50.028**	**159.719**	
Inter. press	**10/01**	**10:55**	**208.648**	**49.751**	**158.897**	**-0.821**
Inter. press	**10/01**	**11:55**	**208.377**	**49.742**	**158.635**	**-1.084**
Inter. press	**10/01**	**12:55**	**208.318**	**49.754**	**158.564**	**-1.155**
Inter. press	**10/01**	**13:50**	**208.283**	**49.751**	**158.532**	**-1.186**
Start of test	**10/02**	**07:30**	**207.307**	**49.547**	**157.761**	**-1.958**
Total time		**39**	**hrs.**			

(Minimum time is 36 hours.)

Note:
The observed change in differential pressure does not indicate significant interface movement during this period.

Test Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start of test	**10/02**	**07:30**	**207.307**	**49.547**	**157.761**	
Inter. press	**10/02**	**08:30**	**207.250**	**49.537**	**157.713**	**-0.047**
Inter. press	**10/02**	**09:30**	**207.205**	**49.525**	**157.680**	**-0.081**
Inter. press	**10/02**	**10:30**	**207.160**	**49.510**	**157.650**	**-0.111**
Inter. press	**10/02**	**11:30**	**207.130**	**49.520**	**157.610**	**-0.151**
Inter. press	**10/02**	**12:30**	**207.091**	**49.516**	**157.575**	**-0.186**
Inter. press	**10/02**	**13:30**	**207.071**	**49.516**	**157.555**	**-0.206**
Inter. press	**10/02**	**14:30**	**207.056**	**49.522**	**157.534**	**-0.226**
Inter. press	**10/02**	**14:50**	**207.047**	**49.519**	**157.528**	**-0.233**
End test	**10/02**	**15:30**	**207.030**	**49.522**	**157.508**	**-0.253**

Test Period **8** hrs
Average pressure change **-0.032** psi/hr

Maximum allowable pressure change is 0.05 psi/hr over 8 hours.

If the test was conducted in accordance with the method approved in the USEPA notice published in the Federal Register of August 18,1989, page 34169-34171 (as amended in Federal Register of November 14, 1989, page 47451) and the rate of pressure change during the test period was less than 0.05 psi/hour, the well has passed the test and demonstrated internal mechanical integrity.

Result : **PASSED TEST**

Comments

Test and reference well pressures were read simultaneously during the eight-hour test period. A slip blind temporarily placed in the pipeline dripped slightly through the test period.

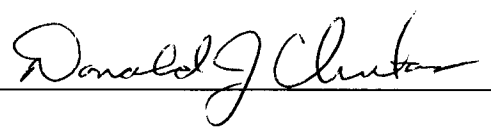
Person conducting test:

Jonelle Echert
Production Supervisor
Cargill, Inc
518 E 4th Street
Watkins Glen, NY
(607)535-6341

Witnessing field personnel: **None**

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for the submission of false information, including the possibility of fine and imprisonment for knowing violations.

Signature of owner/authorized agent : 

Don Chutas
Plant manager
Cargill, Inc
(607)535-6303

Attachments :

Field data sheets (1)

Target Depth: 1708 Ft

56: ~~1195~~ 1203
99.5%

TOPO0 casing 1758 FT ~~Production~~

FIELD DATA SHEET

TEST WELL 21
REFERENCE WELL 24

150.1315
Δ = ~~144.2119~~ psi
ΔFinal = 159.0634

INSTRUMENT S/N 112335
INSTRUMENT S/N ____

DATE	TIME	TEST PRESS. (21)	REF PRESS. (24)	DIFFERENCE	OPER. INIT.	REMARKS
9/30	1PM ~~1200~~	58.5108 ~~49.5~~	49.5787	8.9321	JAE	Start
9/30	220	139.9820	49.8680	90.1140	JAE	injecting
9/30	320	177.8614	49.9536	127.9078	JAE	injecting
9/30	410	209.7460	50.0275	159.7185	JAE	END
10/1	1055	208.6479	49.7507	158.8972	MDW	stabilization
10/1	1155	208.3765	49.7418	158.6347	MDW	"
10/1	1255	208.3183	49.7544	158.5639	MDW	"
10/1	150	208.2831	49.7510	158.5321	MDW	"
10/2	730	207.3073	49.5467	157.7606	MDW	test start
10/2	830	207.2498	49.5365	157.7133	MDW	
10/2	930	207.2047	49.5247	157.7223	MDW	
10/2	10:30	207.1595	49.5099	157.6496	MDW	
10/2	11:30	207.1295	49.5196	157.6099	MDW	
10/2	1230	207.0910	49.5163	157.5747	MDW	
10/2	0130	207.0706	49.5161	157.5545	MDW	
10/2	0230	207.0558	49.5216	157.5342	MDW	[illegible]
10/2	250	207.0467	49.5190	157.5277	JAE	
10/2	330	207.0297	49.5216	157.5081	JAE	END
10/1						
10/3	730	206.3227	49.3023			

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Address

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(607) 535-6300

General Information

UIC Permit	**NYU105431**
Field	**Watkins Glen**
Test well	**22**
Reference well	**24**
Other wells in gallery	**19,20,21,23**
Test well location	**Lat. 42°-23'-05", Long. 76°-51'-46"**
	Watkins Glen, New York
API No.	**31-097-21630**
Test Date	**11-Oct-13**
Test fluid	**Water**
Result	**PASSED TEST**

Test well data

Well no.	**22**		
Depth of surface casing	**943**	ft.	**Drilling record**
Depth to top of salt formation	**1771**	ft.	**5/07 Gamma ray log**
Depth to top of cavern	**2277**	ft.	**2/13 Gamma ray log**
Depth of production casing	**2271**	ft.	**2/13 Gamma ray log**
Depth of tubing (if present)	**none**	ft.	
Total depth	**2346**	ft.	**2/13 Gamma ray log**
Original total depth	**2687**	ft.	**Drilling record**
Outer diameter of production casing	**7**	in.	**Drilling record**
Outer diameter of tubing (if present)	**none**	in.	
Capacity of casing or annulus	**1.607**	gpf	
Volume of casing or annulus	**3649**	gals.	
Normal operating pressure	**300**	psig	
Mode of last 24 hours of operation	**injection**		

All depths referenced to wellhead , elev. 445

Reference well data

Well no.	**24**		
Depth of surface casing	**812**	ft.	**Drilling record**
Depth to top of salt formation	**1782**	ft.	**9/96 Gamma ray log**
Depth to top of cavern	**2503**	ft.	**9/98 Gamma ray log**
Depth of production casing	**2580**	ft.	**Drilling record**
Depth of tubing (if present)	**none**	ft.	
Total depth	**2560**	ft.	**6/97 Gamma ray log**
Original total depth	**2615**	ft.	**Drilling record**
Outer diameter of production casing	**7**	in.	**Drilling record**
Outer diameter of tubing (if present)	**none**	in.	
Capacity of casing or tubing	**1.607**	gpf	
Volume of casing or tubing	**4146**	gals.	

All depths referenced to wellhead , elev. 445
Casing is perforated at 2550'

Target Depth for Interface — Normally 50 feet above the end of the casing or the cavern roof, whichever is shallower

Depth **2221** ft.

Instrumentation

Well	Test	Reference
Manufacturer	**Paroscientific**	**Paroscientific**
Model	**760-1K**	**760-1K**
Serial No.	**112333**	**115418**
Accuracy	**0.01%**	**0.01%**
Precision	**0.001 psi**	**0.001 psi**

Preparation

If the casing of the test well was most recently used for brine production, flush with water to remove any crystallized salt.

Date and time test well was flushed

Approximate volume in gallons

Shut-in period with water in casing

Comments

Second date and time well was flushed

Approximate volume in gallons

Shut-in period with water in casing

Comments **Well was not flushed, as it was last used for injection.**

The test well must be bled back to ensure that it is filled with a fluid of uniform density. Bleed back at least the volume of the casing or annulus.

Date test well was bled back **09/18/13**

Approximate volume in gallons **10500**

Specific gravity of fluid **1.195**

Comments A slip blind was placed in the surface piping after the well was bled back to prevent leakage out of the wellhead.

The reference well must be bled back to ensure that it is filled with a fluid of uniform density. Bleed back at least the volume of the tubing or casing.

Date and time ref well was bled back **09/17/13**

Approximate volume in gallons **35000**

Specific gravity of fluid **1.204**

Comments

Set Interface

Test fluid	**Water**
Specific gravity of test fluid	**1.000**
Specific gravity of brine	**1.195**

Calculate maximum permissible injection rate and target pressure differential.

Capacity of casing or annulus		Allowable velocity		Maximum inj. rate
1.607 gpf	x	20 fpm	=	**32** gpm

Target interface depth x gradient diff. = target pressure diff.

2221 ft. x (1.195 - 1.000) X 0.433 = 187.5 psi

Date **09/30/13**

	Time	Test Well	Ref. Well	Diff.	change in diff.
Pressures before injection	**08:50**	**66.750**	**48.978**	**17.772**	
Pressures during injection	**10:25**	**182.000**	**49.359**	**132.641**	**114.869**
Pressures during injection	**11:10**	**197.595**	**49.406**	**148.190**	**130.418**
Pressures after injection	**12:00**	**255.281**	**49.592**	**205.689**	**187.917**

All pressures measured in psia

Calculated final interface depth

187.917 psi / ((1.195 - 1.000) X 0.433) = 2226 ft.

Note :
Injected fluid volume was not measured.

Temperature Stabilization Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start Stabilization	**09/30**	**12:00**	**255.281**	**49.592**	**205.689**	
Inter. press	**09/30**	**15:20**	**255.971**	**49.954**	**206.018**	**0.329**
Inter. press	**10/01**	**10:55**	**254.278**	**49.750**	**204.528**	**-1.161**
Inter. press	**10/01**	**13:50**	**254.029**	**49.751**	**204.278**	**-1.411**
Inter. press	**10/02**	**07:30**	**252.487**	**49.547**	**202.940**	**-2.749**
Inter. press	**10/02**	**16:30**	**251.620**	**49.521**	**202.099**	**-3.589**
Inter. press	**10/02**	**23:30**	**251.031**	**49.405**	**201.626**	**-4.063**
Start of test	**10/11**	**09:00**	**243.489**	**48.451**	**195.038**	**-10.651**
Total time		**261**	**hours**			

(Minimum time is 36 hours.)

Note :
A test was attempted on 10/2, but a wellhead flange leaked too badly to meet the test criteria. A portion of the wellhead was isolated to repair the flange leak. The wellhead was monitored until 10/11 when the retest was performed.

Test Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start of test	**10/11**	**09:00**	**243.489**	**48.451**	**195.038**	**0.000**
Inter. press	**10/11**	**10:00**	**243.488**	**48.459**	**195.029**	**-0.008**
Inter. press	**10/11**	**11:00**	**243.482**	**48.470**	**195.011**	**-0.026**
Inter. press	**10/11**	**12:00**	**243.472**	**48.478**	**194.994**	**-0.044**
Inter. press	**10/11**	**13:00**	**243.445**	**48.482**	**194.963**	**-0.075**
Inter. press	**10/11**	**14:00**	**243.436**	**48.478**	**194.957**	**-0.080**
Inter. press	**10/11**	**15:00**	**243.421**	**48.477**	**194.944**	**-0.094**
Inter. press	**10/11**	**16:00**	**243.399**	**48.468**	**194.931**	**-0.107**
End test	**10/11**	**17:00**	**243.382**	**48.464**	**194.918**	**-0.120**

Test Period	**8**	hrs
Average pressure change	**-0.015**	psi/hr

Maximum allowable pressure change is 0.05 psi/hr over 8 hours.

If the test was conducted in accordance with the method approved in the USEPA notice published in the Federal Register of August 18,1989, page 34169-34171 (as amended in Federal Register of November 14, 1989, page 47451) and the rate of pressure change during the test period was less than 0.05 psi/hour, the well has passed the test and demonstrated internal mechanical integrity.

Result : **PASSED TEST**

Comments

Test and reference well pressures were read simultaneously during the eight-hour test period.
The calculated interface depth during the test was 2100', well above the initial setting depth, but below the final planned roof.

Person conducting test:

Jonelle Echert
Production Supervisor
Cargill, Inc
518 E 4th Street
Watkins Glen, NY
(607)535-6341

Witnessing field personnel: **None**

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for the submission of false information, including the possibility of fine and imprisonment for knowing violations.

Signature of owner/authorized agent : Donald J Chutas

Don Chutas
Plant manager
Cargill, Inc
(607)535-6303

Attachments :

Field data sheets (1)

1.195
96%

Target Depth: 2221 FT

Top of production casing 2271 FT

FIELD DATA SHEET

TEST WELL 22

REFERENCE WELL 24

Δ target = 187.5301

ΔFinal = 205.302

INSTRUMENT S/N

INSTRUMENT S/N

DATE	TIME	TEST PRESS. 22	REF PRESS 24	DIFFERENCE	OPER. INIT.	REMARKS
9/30	8:50	66.7501	48.9782	17.7719	JAE	start of injection
9/30	10:25	182.3209	49.3594	132.9615	JAE	while injecting
9/30	11:10	197.5953	49.4058	148.1895	JAE	"
9/30	1200	255.2808	49.5919	205.6889	JAE	End
9/30	320	255.9712	49.9536	206.0176	JAE	start stablization
10/1	1055	254.2778	49.7507	204.5271	MDW	stabilization
10/1	1155	254.1904	49.7418	204.4486	MDW	"
10/1	1255	254.1034	49.7544	204.3490	MDW	"
10/1	150	254.0288	49.7510	204.2778	MDW	"
10/2	730	252.4865	49.5467	202.9398	MDW	↘
10/2	830	252.4073	49.5365	202.8708	MDW	test start
10/2	9:30	252.3193	49.5247	202.7946	M.D.W	
10/2	10:30	252.2311	49.5099	202.7212	M.D.W	
10/2	11:30	251.9056	49.5196	202.3860	M.D.W	
10/2	12:30	251.8356	49.5163	202.3193	M.D.W	
10/2	0130	251.7840	49.5161	202.2679	M.D.W	11:20 251.9481
10/2	0230	251.7310	49.5216	202.2094	M.D.W	
	250	251.7039	49.5190	202.1849	JAE	
10/2	330	251.6856	49.5216	202.1640	JAE	END
	730	250.8070	49.3823			

0.069
0.0762

254.28

586-530-8111
Mike

F	S	S	M
11	12	13	14

535-9900

10/11/13

8:38 AM

Test start 243.4877 (22) 48.4573 =

Time	22	24	Δ	
9	243.4885	48.4509	195.0376	JAB
10	243.4882	48.4589	195.0293	JAB
11	243.4815	48.4702	195.0113	JAB
12	243.4720	48.4784	194.9936	JAB
1	243.4551	48.4823	194.9728	JAB
2	243.4357	48.4784	194.9573	JAB
3	243.4206	48.4771	194.9435	JAB
4	243.3990	48.4682	194.9308	JAB
5	243.3822	48.4643	194.9179	

Gray Dog 535-8222

Visit cats/Dogs

5522-5904-6007

~~1240 243.4483~~

22 24

10-11/13 - @ 9:40 243.4918 ← 9:45

48.4515